Seychelle – In-Line Eliminator™ Water Filtration System

www.seychelle.com

Device Information

The In-Line Eliminator water filtration system is an in-line filter device designed for use with commercial hydration packs. The in-line filter contains a filter cartridge similar to Seychelle's Flip-Top's silver-impregnated filter. The filter cartridge is contained in a sturdy plastic housing with separate inlet and outlet for connecting to the drink tube of a hydration pack. The silver-impregnated activated carbon filter is a 6 cm long hollow-core filter with a 0.6 cm thick wall. The carbon block filter is rated a 2 µm pore size. There is a final coarse filter inside the hollow core where water exits the filter cartridge. Information provided on Seychelle's website indicates the device removes or reduces 99.9% (3-log) *Cryptosporidium* oocysts, and 99.99% (4-log) *Giardia* cysts, as well as various removals of certain inorganic and organic chemicals, including tastes and odors. The information also notes that when using water where viruses could be present, it is strongly recommended to add a disinfectant to the hydration pack before filtering. After installing the in-line filter on the drink tube line (fittings are included with the in-line filter) water flows from the hydration pack into the in-line filter housing where it will flow from the outside of the carbon block filter into the inside hollow core and through the final coarse filter before exiting the filter housing. Prior to use the filter cartridge must be flushed to remove particle fines. The flush process recommended is essentially a backflush process. Also, it is recommended that after extended use the filter be backflushed to prolong the useful life. No directions are provided on how to store the filter.

Effectiveness Against Microbial Pathogens

No data was received showing the effectiveness of this product with respect to the U.S. Environmental Protection Agency (USEPA) Guide Standard Protocol for Testing Microbiological Water Purifiers (reference 1). The theory and practice of depth filtration has been widely studied and there has been significant research conducted on activated carbon block filtration (reference 2). In the absence of data specific to this device tested using reference 1, and based on general knowledge of depth and carbon block filtration, this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1 (i.e., 3-log) when used as directed. It is not expected to consistently reduce bacteria (6-log) and viruses (4-log). The silver impregnated into the filter is not designed to reduce microbial pathogens in water being treated. Rather, its purpose is to

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inhibit bacterial growth on the filter throughout the filter's useful life. Based on general depth and carbon block filtration information, the In-Line Eliminator filter is assigned one √ for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts and an X for bacteria and virus reduction (for an explanation of the rating checks click here).

Table. Expected Performance Against Microbial Pathogens When Used as Directed.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	> 6-log	X	-
Viruses	> 4-log	X	-
Giardia cysts	> 3-log	√	size exclusion
Cryptosporidium oocysts	> 3-log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is an in-line filter designed to be used with a hydration pack, the actual production rate is dependent on the user. The production capacity is stated at up to 380 L. However, production capacity will vary widely with raw water quality (i.e., turbidity).

Cleaning, Replacement, and End of Life Indicator

Based on directions and supplies provided, this device can be backwashed to remove sediment from the filter that could prolong the life of the filter. When the device becomes unusable due to decreased production rate after backwashing, the clogged filter must be replaced. For practical purposes, the filter cartridges are not cleanable. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight	110 grams
Size (height x diameter)	13 cm x 5 cm

Cost

In-Line Eliminator with silver-impregnated filter $23.00
No replacement filter information provided.

Device Evaluation

No data was received that challenged the Flip-Top Straw Filter Bottle against reference 1. General research on depth and carbon block filtration indicates that this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts. This device is not likely capable of consistently reducing bacteria and viruses. Additional treatment is necessary to remove bacteria and viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the hydration pack prior to filtering. There is a possibility that silver can leach from the silver-impregnated cartridge filter and be consumed. Although no data was received evaluating the potential for silver leaching, it is not likely that using this device for short periods would cause any adverse health effects due to silver ingestion (reference 2). This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. The device can be backwashed to remove accumulated particulates, effectively prolonging the useful life of the filter. Once the filter remains clogged after backwashing, it must be replaced. There is no indicator of process failure or end of device useful life.

Advantages

- Expected to consistently provide adequate protection from *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- No wait time prior to consumption.
- Simple and effective.
- Backwashable.
- Provides taste and odor reduction.

Disadvantages

- Not expected to be consistently effective against bacteria and viruses. Additional treatment necessary.
- Reduced production capacity when using high turbidity water.
- No real-time indicator of process failure.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.

2. U.S. Army Center for Health Promotion and Preventive Medicine. (2005). *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices,* Aberdeen Proving Ground, MD.